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example the appearance of stickiness for the mold. This condition may occur due reduction of plastic strength and with increasing thea fluidity of the ceramic materials.

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PERFECTION OF PROCESS OF MOIST AND THERMAL TREATMENT OF GRAIN OF CULTURES OF GROATS IN THE PRODUCTION OF CONCENTRATES ON THE BASIS OF KAZAKH NATIONALLY-TRADITIONAL TECHNOLOGY

Anipa Askarova, Jamilia Aidarova, Ardak Askar...

Types of equipment for thermal treatment of grainy products moisture and heat, used in the production of concentrates of groats and on the enterprises of public food consumption not effective that moisture /water, steam/ unevenly spreads in a product. Layers of product, being nearer to the surface of capacity of caldron quicker exposed to influence of heat, that higher being layers. With the purpose of receipt of products of homogeneous quality on composition, mass in a capacity is mixed. However mechanical interfusion is damaged grains of /зернышек/. On Kazakh nationally-traditional technologies /KazNTT/ the production of concentrates of groats is related to treatment a heat and moisture to the not croup, and initial grain, at that rate interfusion of product results in the premature removal of episperm, that reduces to efficiency of process on the whole.

In an equipment, working at atmospheric pressure a process occupies considerable time, and with creation of pressure in a working environment a process is accelerated. However absence of even distribution of coolant-moderator in a working environment reduces technological efficiency of process on the whole: composition of product appears uneven from the uneven temperature field between the layers of product into a caldron.

When you select the rational way of processing equipment should be selected from the condition of ensuring an even distribution of heat transfer fluid inside of the masses on the basis of the laws of conservation of mass and the amount of traffic, excluding mixing. Short treatment product overpressure speeds up the process and reduces the amount of energy. Regardless of the pressure, ensuring an even distribution of heat inside the product remains the main condition.

At the choice of rational method of treatment it is necessary to choose the construction of vehicle from a condition providing of even distribution of coolant-moderator into the processed mass on the basis of laws of maintenance of mass and amount of motion, исключая interfusion. Of short duration treatment of product under surplus pressure accelerates a process and reduces

hundred percent coverage of all students at the university. Exceptions are the stude... exemption from physical training classes due to health reasons. Massive health, physica... and sports activities should be aimed at the broad involvement of students in regular phys... sports training sessions, to promote health, improve the physical fitness of students. T... sessions should be organized in students' free time, on weekends and holidays. And they sh... take place in recreational and sports camps during school practices. These events can be h... the basis of a broad initiative of students with the guidance of physical education departm... also with the active participation of other organizations of the university.

And second area is the individualization of physical education of students. We sh... identify the most gifted in physical education students and contribute to their introduction ... sport. There are many positive examples of other countries' national teams that are made ... university students.

How can it be realized? The course of study at the physical education facul... university provides the following mandatory and standard tasks:

• Education of students of high moral and physical qualities that will be ready for ... performance;

• Maintaining and improving the health of the students, promoting the correct formati... of all-round development of the body, maintaining high efficiency over the entire period ... study;

• Comprehensive physical training of students;

• Professionally applied physical training of students, taking into account the characteristics of their future employment;

• Students' acquisition of the necessary knowledge of the basics of the theory, methodo... and organizational structure of physical education and sports training; preparation for work as community trainers, coaches and referees;

• Improving sports skills of students;

• Education of belief in the need to regularly engage in physical culture and sports.

In the daily routine physical exercises are designed to improve health, increase mental and physical performance, improve educational conditions of work, life and leisure of students. It is necessary to raise the issue in front of the Ministry of Education and Science of the Republic of Kazakhstan of increasing the time budget that is dedicated to physical education of students by introducing weekly hours of these training sessions during the whole education process.

Currently, there is such situation that physical education in universities is almost finished by the end of the 2nd year of study and the further training at the undergraduate level depends on consciousness, will, psychology of each student. And here are two possible solutions to this problem. The first one is the optimization of the available hours of physical education. And the second one is the continuation of physical education of students at the undergraduate level.

And since we are talking about the health of the nation, it would be advisable to introduce the state exam for students in all majors of physical training. Then we will get real results from our work on physical education and significantly improve the health of our nation.

INFLUENCE OF SURFACTANTS TO ARHEOLOGICAL PROPERTIES OF CERAMIC MATERIALS

Dana Artykova, Kuanyshbek Mussabekov

Introduction

One of the most important uses of clay minerals is the production of a variety of building materials - building bricks, facing bricks and ceramic tiles - household items and art objects, etc.,

for which an important role is played by the formability of the ceramic materials [1]. Formability of the ceramic paste is determined by its structural and mechanical type, which is setting on the basis of a detailed analysis of the structural and rheological characteristics. From this existing six structural and mechanical types with good formability have only concentrated suspensions related to the first, and in particular, to the second type with the property to make any molds, and leave no trace of them [2].

Many natural clay minerals are not capable of forming a paste relating to these types. Changing the structural mechanical type of clay suspensions may be accomplished by small additions of surfactants. Kaolinite clay from Koskudyk deposit in Kazakhstan used for the production of building bricks. However, molding of ceramic products and art trade objects from clay paste is empirically and without scientific basis.

In this regard, structural and rheological analysis of concentrated clay suspensions and clarification of the influence of factors (concentration of surfactants, the modifying effect) on the structural and mechanical type of suspension are urgent problems of colloidal chemistry and physical-chemical mechanics. And so the objective of the present study was to study the influence of surfactants such as cetylpyridinium bromide (CPB), sodium dodecyl sulfate (SDDS), ethoxylated-alkyl-phenol (OP-10).

Experimental details

Natural raw kaolinite samples collected from the Koskudyk deposit, Kazakhstan. Cetylpyridinium bromide (CPB), sodium dodecyl sulfate (SDDS), ethoxylated-alkyl-phenol (OP-10) were used in this work. The infrared spectra was acquired using 1204 Furrier spectrophotometer. The spectra were taken in the region 500-4000 cm^{-1}. The room temperature was 25°C during the experiment.

Results and discussion

In adding of surfactant to kaolinite clay suspension was changed of structural and mechanical properties and also was changed the suspension type. The results of analysis of the influence on limit strength of surfactant suspension shown in Fig. 1.

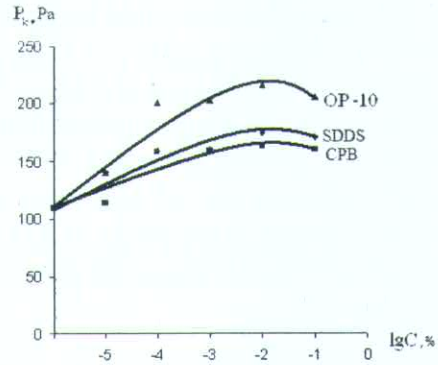

Figure 1. The influence of surfactant concentration on the limite strength of a kaolinite clay suspension.

The extreme dependence of the $P_k=f(C)$, apparently due to the formation in the first monomolecular layer, and then the bimolecular layer of surfactant adsorption on the surface of clay particles. Formation of a monomolecular layer of surfactant by contacting the aqueous phase with hydrophobic radicals may deteriorate the surface wettability of the kaolinite particles and consequently, to increased adhesion of the dispersed phase by hydrophobic interactions and Van der Waals forces. Forming a second layer of surfactant facing the dispersion medium with polar groups can improve the wettability of the surface of the clay particles, the consequence of which is a weakening of the cohesion of the particles. The data in Figure 1 demonstrate the futility of increasing the concentration of demonstrated surfactants above their critical micelle concentration (CMC).

Kaolinite clay (KC) has a complicated chemical structure, which is mainly composed of

negatively charged particles with tetrahedral and octahedral hydroxyl groups are prone t hydrogen bonds [3].

Shown in Fig. 3 are the IR spectra of kaolinite. The very strongly multiplet at 551-45 cm^{-1} is due to O-Si-O and Si-O-Si inter tetrahedral bridging bonds in silicon-oxigen skeleto Quartz (α-quartz) interference could be observed at a 877-647 cm^{-1} for the studied kaolinite. I the 1113-1003 cm^{-1} and 981-991 cm^{-1} region, main functional group were Si-OH and Al-OH Also the peak at 518.9 cm^{-1} is attributed to the vibrations of Si-O-Al match. An importa component of a layered silicate is crystal water and hydroxyl groups. The absorption band observed at 3398 cm^{-1}, 3541 cm^{-1}, 3435 cm^{-1} and 3618 cm^{-1} could be assigned to the covale intermolecular vibrations and intermolecular hydrogen bands. Also the peak at 3618 cm^{-1} attributed to the vibrations of the adsorbed water molecules in the interlayer space kaolini layered structure.

Modifying effect of water soluble polymers and surfactants and their compositions on th structural and mechanical properties of concentrated suspensions of kaolinite clay could be du to their adsorption on the surface of clay particles. About adsorption of sodium dodecyl sulfat on the surface of kaolinite particles indicated by the presence of absorption peaks at 3097 cm corresponding to the stretching vibration of C-H groups and at 2808 cm^{-1} relating symmetri vibrations of CH_3 groups. The peak at 694 cm^{-1} is attributed to the valence vibrations of the S-O bands (Fig. 3). Another new peak is found at 2981 cm^{-1} in kaolinite sample in the presence o cetylpyridinium bromide due to symmetric stretch of $-CH_3$ group. The molecule of pyridi absorption peaks was identified at 709 cm^{-1} and 1083-1002 cm^{-1}. A listed strong smoothing pea of 527-458 cm^{-1} and 1083-1002 cm^{-1} shows a significant reduction of the relative area. Thi indicates shows about the presences of electrostatic and hydrophobic interactions and hydroge bonds.

Figure 5 is the IR spectrum of kaolinite clay in the presence of OP-10. The peak at 28 cm^{-1} is assigned to vibration bands of methyl group and also the peak at 2854.8 cm^{-1} is assigne to stretching vibration of methylene group. The absorption band at 3397 cm^{-1} corresponds to th specific vibrations of N-H and C-N, also the absorption band at 1649 cm^{-1} and 1632 cm^{-1} are du to fluctuations in the aromatic compounds and carbonyl group. Comparative analysis of the IR spectrum shows that the typical kaolinite multiplets at 547-459 cm^{-1} are shifted into a triplets a 521 cm^{-1}, 474 cm^{-1}, 455 cm^{-1}. Second multiplets characteristic to α-quartz, being in the 111 1003 cm^{-1} and shifted to a multiplet in the region at 1083-993 cm^{-1}. These peaks are significantly reduced, indicating that the interaction on the all hydrogen molecules in this system. Image intensity of absorption and the relative area of the peaks at 3583 cm^{-1} and 3540 cm^{-1} indicates an increase in hydrogen bonds between the molecules. The free hydroxyl groups of adsorbing wit kaolinite water are found in 3617 cm^{-1}.

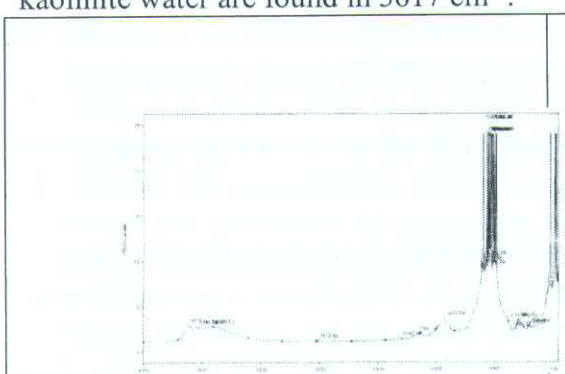

Figure 2. The infrared spectra of kaolinite samples

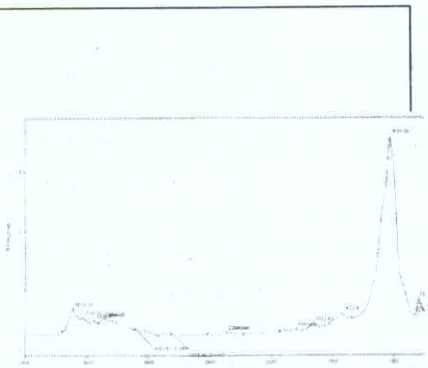

Figure 3. The infrared spectra of kaolinite in the presence of sodium dodecyl sulfate ($C_{SDS}=1\cdot10^{-4}$ %)

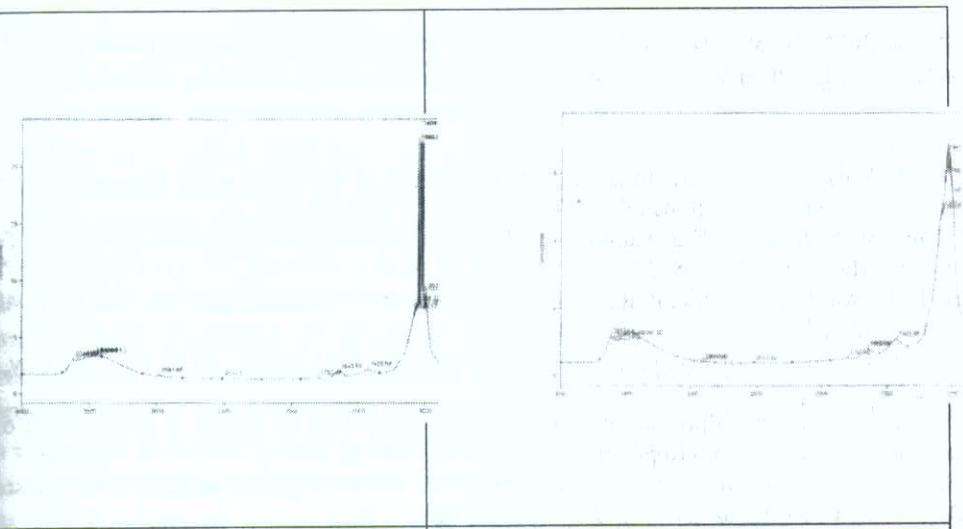

Figure 4. The infrared spectra of kaolinite in the presence of cetylpyridinium bromide ($C_{CPB}=1\cdot10^{-5}$ %)

Figure 5. The infrared spectra of kaolinite in the presence of OP-10 ($C_{OP\text{-}10}=1\cdot10^{-3}$%)

Patent researches has shown that the existing development in this area relate mainly flocculation of clay minerals [4] with polyelectrolytes for efficient wastewater treatment [5] and for synthesis of drilling fluids suspensions [6], for the study of the processes of coagulation and flocculation in dilute clay hydrodispersion and for structuring of soil [7]. However, comprehensive studies in the field of structural and mechanical properties of Kazakhstan clays by using of physical-chemical mechanics methods are extremely scarce.

According to the theory of Academician P.A. Rebinder and his school [8] high-quality ceramic materials should be characterized by certain criteria, such as with elasticity λ <0,5-0,6, with plasticity $P \leq (6\text{-}8)\cdot10^{-5}$ sec^{-1} and with relaxation period at $\theta \geq 400\text{-}450$ seconds. Ceramic materials with high quality in the ternary diagram should be in the region of the first and particularly the second structural- mechanical type. Suspension is considered to be the most quality, located near the middle or top of γ'_2 ternary diagram.

Structurally-mechanical analysis showed that the kaolinite suspension in the presence of surfactants (C_{SDDS} = 10^{-4}%, $C_{CPB}=10^{-5}$% and $C_{OP\text{-}10}=10^{-3}$%) is in the second structural mechanical type (Table 1).

Table 1. The quality criteria for structured with surfactants suspensions

Clay suspension	Elasticity λ	Plasticity P, sec^{-1}	Relaxation period θ, sec
KC –SDDS ($C_{SDDS}=1\cdot10^{-4}$%)	0,987	$3{,}08\cdot10^{-4}$	427,19
KC – CPB ($C_{CPB}=1\cdot10^{-5}$%)	0, 962	$7{,}5\cdot10^{-4}$	437,6
KC – OP10 ($C_{OP10}=1\cdot10^{-3}$%)	0,97	$1{,}59\cdot10^{-3}$	380,13

However, as can be seen from Table 1, in elasticity ($\lambda \sim 0{,}98$) and plasticity ($P\sim3\cdot10^{-4}$-$1{,}6\cdot10^{-3}$) of kaolinite, modifying with surfactants not meeting to the criteria of high-quality ceramic materials (λ<0,5-0,6 and $P\leq(6\text{-}8)\cdot10^{-5}s^{-1}$) .

Conclusion

Use of surfactants can change of the process of structure formation in a suspension of kaolinite and also change its structural and mechanical properties by reducing the formation of micro-cracks on drying and by increasing the workability of the ceramic material. But it is not possible to obtain high-quality ceramic materials, because surfactants is reduce excessive elastic properties of ceramic materials. This leads to certain undesirable defects in the molding, for